

Application Notes

The SSR3A Solid-State Relay board is designed for switching applications requiring high voltage, low current loads. The installed 1200V IGBTs enable the device to act as a bidirectional, isolated relay with a standoff voltage of 1200V. The on-board driver, isolator, and DC-DC Converter chips are all protected against high voltage transients if one or both of the IGBTs should breakdown. Protection circuitry for the IGBTs was intentionally left off of the board for added flexibility for various application circuits.

The installed IGBTs come in transistor sockets for convenient replacement and can be substituted with a variety of other IGBTs or MOSFETs with comparable characteristics. Below is a table of recommended substitute MOSFETs and IGBTs.

MOSFETs				
Part Number	Voltage	Current	Gate Capacitance	On Resistance
STP16NF06	60 V	16 A	315 pF	0.1 Ω
IRF820A	500 V	2.5 A	340 pF	3 Ω
IRF840	500 V	8 A	1300 pF <i>76.9MHz</i>	0.75 Ω
STP2NK60Z	600 V	1.4 A	170 pF	7.2 Ω
SPA02N80C3	800 V	2 A	290 pF	2.7 Ω
STP5NK100Z	1000 V	3.5 A	1154 pF	2.7 Ω
STP4N150	1500 V	4 A	1300 pF <i>76.9MHz</i>	< 7 Ω

IGBTs				
Part Number	Voltage	Current	Gate Capacitance	On Resistance
STGF3NC120HD	1200 V	3 A	470 pF	~0.73 Ω @ 3 A
IRGB5B120KD	1200 V	6 A	370 pF	~0.6 Ω @ 6 A

If MOSFETs or IGBTs other than those listed are to be used, please note the following:

1. The gate capacitance of the MOSFET determines the maximum operating frequency. As long as the maximum current listed in the parameters table is not violated, any MOSFET or IGBT can be used. If higher frequencies are desired, the SSR3A is capable of operating at frequencies up to 15MHz which is limited only by the bandwidth of the on-board optoisolator.
2. All IGBTs must have an internal body diode in order for the SSR3A to operate as a bidirectional switch. If the user desires to use an IGBT which does not contain a body diode, the SSR3A can be operated as a unidirectional switch by removing one of the two IGBTs and shorting pins 2 and 3 of the unused Transistor socket.

As noted in above it is possible to optimize the maximum operating frequency and power consumption of the SSR3A by choosing an IGBT or MOSFET with the lowest gate capacitance. If the maximum operating voltage is not of great concern, the user may use other lower-voltage MOSFETs to operate the switch at higher frequencies without maxing out the power supply. Another technique is to remove one of the two transistors from the heatsink. By shorting pins 2 and 3 of the unused socket, the